AMENDMENTS TO THE SPECIFICATION

Page 3

The paragraphs at lines 9-24 have been amended as follows:

Fig. 1 is a schematic drawing of an engine control system and an engine to which the engine control system is ~~applicable.~~applicable;

Fig. 2(a) is a diagram showing waveform of fuel pressure in a main injection mode of the engine control ~~system.~~system;

Fig. 2(b) is a diagram showing waveforms of fuel pressure in a pilot-and-main fuel injection mode of the engine control ~~system.~~system;

Fig. 3 is a graph illustrating variations of an NO.sub.2/NOx ratio when the engine is actuated in the pilot-and-main injection mode by the engine control ~~system.~~system;

Fig. 4 is a map used to set a fuel injection amount and fuel injection timing in the pilot-and-main injection ~~mode.~~mode;

Fig. 5 is a graph showing relationships between catalyst temperatures and NOx purifying efficiency of a NOx catalyst in the engine of ~~Fig. 1.~~Fig. 1;

Fig. 6 is a flowchart of a main routine of an ECU of an exhaust system of the engine shown in ~~Fig. 1.~~Fig. 1; and

The paragraph at lines 32-36 has been amended as follows:

The engine 1 is controlled by an engine control unit 3 (called "the engine ECU 3") of the engine control system. A NOx purifying facility ~~2 in~~2 provided in an exhaust system is controlled by an exhaust gas control unit 4 (called "the exhaust ECU4"). The engine ECU3 and exhaust system ECU4 communicate with each other via a communication control line 5.

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The paragraph at lines 19-28 has been amended as follows:

The fuel injection system includes a fuel pressure regulating section 12, and an injection controlling section 11 which injects fuel to a combustion chamber (not shown) using injectors 10. These sections 12 and 11 are controlled by the engine ECU3 functioning as a pressure controller n1 and an injection controller n2. The engine 1 actuates the injectors 10 in either a main injection mode M1 conducting only the main injection or a pilot-and-main injection mode M2 conducting pilot injection and main injection. The pilot injection precedes the main injection. Refer to FIGS. 2(a) and 2(b) which illustrate fuel pressure in waveforms when fuel is injected in the main injection mode and the pilot-and-main injection mode, ~~respectively..~~respectively.

Page 5

The paragraph at lines 8-12 has been amended as follows:

The injection controller n2 derives a basic fuel injection amount INJb on the basis of the engine speed Ne and accelerator pedal depression $\theta\alpha$ ~~(i.e. an~~ (i.e., an engine load). The fuel injection amount Gf is derived by adding a revised water temperature dt and revised value dp of the boost pressure $P\alpha$ to the basic fuel injection amount INJb ~~(i.e.~~(i.e., Gf=INJb+dt+dp).

The paragraph at lines 13-26 has been amended as follows:

The pilot-and-main injection mode M2 is adopted for the reasons described later in detail. In this mode, quality of fuel injected by the pilot injection is improved, ~~i.e. the~~ i.e., the NO_2/NOx ratio of exhaust gasses is raised, which improves the NOx purifying efficiency.

The paragraph at lines 25-29 has been amended as follows:

The injection controller n2 selects the main injection mode M1 when a ~~catalyst~~ catalyst temperature Tg is high (e.g., 300°C or higher) ~~(e.g. 300°C or higher)~~ where the NOx purifying efficiency is relatively high, and injects all of fuel in the fuel injection amount Gf at the main injection timing θp.

Pages 5-6

The paragraph beginning on page 5, line 29 and ending on page 6, line 4 has been amended as follows:

When the ~~catalyst~~ catalyst temperature Tg is low (e.g. approximately 200°C) ~~(e.g. approximately 200°C)~~, the injection controller n2 selects the pilot-and-main injection mode M2. The injection controller n2 has a map m1 (shown in FIG. 4) which is prepared by experimentally deriving the basic fuel injection amount INJb, basic injection timing θb and basic pilot injection timing θpb for each engine operation area en. The map m1 is used to raise the NOx purifying efficiency as much as possible in the engine operation area in accordance with the engine speed Ne and the accelerator pedal depression θa, and to improve the NO_2/NOx ratio. The NO_2/NOx ratio tends to vary with an amount of fuel injected by the pilot injection. For instance, it is known through experiments that when an engine load is 40%, the ratio NO_2/NOx is 36% at 4 mg/st, while the ratio is 44% at 8 mg/st.

Page 6

The paragraph at lines 5-10 has been amended as follows:

The NO_2/NOx ratio is designed to be as large as possible by adjusting the basic fuel injection amount INJb, basic injection timing θb and basic pilot injection timing θpb. It

is known that the NO_2/NOx~~NO_2 NOx~~ ratio is variable between 5% and 80%, when an amount of NOx is derived using the map m1, and the pilot injection amount and pilot injection timing are controlled on the basis of the amount of NOx.

The paragraph at lines 19-22 has been amended as follows:

The NOx catalyst 13 is housed in a NOx converter 18 in the exhaust pipe 21 serving as the exhaust path E. The NOx converter 18 has a casing 181 which houses a catalytic carrier. The catalytic carrier carries metal catalyst (e.g., vanadium oxide V_2O_5).~~(e.g. vanadium oxide V_2O_5).~~

The paragraph at lines 23-32 has been amended as follows:

The Nox catalyst 13 can selectively reduce NOx in exhaust gases by using ammonium (NH_3) as the reducing agent. The urea solution is hydrolyzed to produce ammonium as expressed by the formula (1). Ammonium is supplied to the NOx catalyst 13. The NOx catalyst 13 mainly performs the reaction expressed by the formulas (2) and (3), using ammonium as the reducing agent, and accelerates denitration between NH_3 and nitrogen oxide. Especially, if the catalyst temperature Tg is low, i.e., approximately~~i.e. approximately~~ 200°C, but the NO_2/NOx ratio is large, the NOx purifying efficiency η can be raised as shown by the double-dashed line in FIG. 5. In this case, characteristics of NO are converted to those of $NO+NO_2$.

Page 7

The paragraph at lines 22-27 has been amended as follows:

The process ~~is proceeds~~ proceeds to step sc once the data from the sensors are appropriate. In step sc, it is determined whether or not the catalyst temperature Tg is equal or higher than a preset temperature Th (e.g., 150°C). ~~(e.g. 150°C).~~ If the catalyst temperature Tg is below the preset temperature Th, the process proceeds to step sd. Since the NOx purifying efficiency is low, a low temperature flag FlgL is set to 1, which is sent to the engine ECU3.

The paragraph at lines 28-32 has been amended as follows:

Conversely, when the catalyst temperature Tg is ~~high~~equal to or higher than the preset temperature Th, the process proceeds to step se, where an output corresponding to the amount D_{NHS} of the reducing agent to be added is sent to the adjusting valve 27. The amount D_{NHS} is set on the basis of the detected catalyst temperature Tg. Thereafter, the process is returned to step sb.

Pages 7-8

The paragraph beginning on page 7, line 33 and ending on page 8, line 3 has been amended as follows:

The engine ECU3 conducts an engine control routine shown in FIG. 7. In step a1, the engine ECU3 receives engine

operating data such ~~as the engine~~ as engine speed Ne, accelerator pedal depression θa, unit crank angle $\Delta\theta$, and ~~$\Delta\theta$ and~~ boost pressure $P\alpha$. Further, the engine ECU3 receives, from the exhaust system ECU4, the NOx puriying efficiency η {=(Snoxf-Snoxr)/Snox}, low temperature flag FlgL (=1 or 0) and so on. Thereafter, the process proceeds to step a2.

Page 8

The paragraph at lines 4-9 has been amended as follows:

In step a2, it is determined whether or not the NOx purifying efficiency η is below a preset value ηL (i.e., 20%), ~~(i.e. 20%),~~ which is used as a threshold value to determine that the NOx purifying efficiency η is clearly reduced. In this embodiment, the preset value ηL is set to be 20%. In other words, if this is not satisfied, the NOx purification efficiency η has to be improved.

The paragraph at lines 14-17 has been amended as follows:

If the NOx purifying efficiency η is below 20%, the process proceeds to step a3, where it is determined whether or not the catalyst temperature Tg is below the preset temperature Th (e.g., 150°C) ~~(e.g. 150°C)~~ and whether or not the low temperature flag FlgL is 1.

Page 9

The paragraph at lines 5-16 has been amended as follows:

The engine control system performs the fuel injection in the pilot-and-main injection mode M2 when the NOx purifying efficiency η is equal to or less than the preset value ηL (=20%). This allows the increase of the NO_2/NOx ratio and the improvement of the NOx purifying efficiency η, as shown by the double-dashed line in FIG. 5. However, the NOx purifying efficiency η is usually low, i.e., p1~~i.e. p1~~, as shown by the solid line in FIG. 5 when the catalyst temperature Tg is approximately 200°C. In such a case, the pilot-and-main injection mode M2 is adopted as described above, so that the NOx purifying efficiency η can be increased to the value p2 as shown by the double-dashed line. Therefore, the NOx purifying efficiency η can be quickly improved at a relatively low catalyst temperature, which is effective in promoting detoxification of exhaust gases.

The paragraph at lines 17-29 has been amended as follows:

In the engine control routine, when the NOx purifying efficiency η is below 20% in step a2, the process proceeds to step a3. In step a3, it is determined whether or not the low temperature flag FlgL is 1. If FlgL is 1, the process proceeds to step a5, where the pilot-and-main injection mode M2 is

selected by the engine control system 3. The selection of the pilot-and-main injection mode M2 is ~~decided~~ determined by checking the foregoing factors (in steps a2 and a3), so that the engine control system can reliably perform the fuel injection. If the pilot-and-main injection mode M2 was ~~were~~ selected on the basis of only one factor that happened to deviate from the preset value due to disturbances or the like, the engine control system would switch the main injection mode M1 over to the pilot-and-main injection mode M2 or vice versa extremely frequently, which would cause unstable operation of the engine control system.